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The Changing Workload of a Surgical Unit with a Vascular Interest

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Objectives: *To examine the changing relationship between general and vascular surgical workload on a vascular "firm", over a 6-year period.*
Design: *Retrospective review.*
Setting: *Leicester Royal Infirmary and Professorial Surgical Unit, U.K. 1987–1992.*
Method: *Analysis of audit of all surgical admissions. Relation of vascular surgery to general surgery.*
Results: *There has been a slight decrease (5%) in the number of general surgical elective admissions. Overall, the number of general surgical admissions, both elective and emergency, show a slight increase of about 3%. In contrast the number of vascular admissions increased by 42%. Of the general surgical procedures carried out 75.9% were either minor or intermediate, whereas 92.5% of vascular procedures were coded as major or higher. There has been a three times increase in the number of carotid endarterectomies, a similar increase in the number of the femorodistal bypass grafts and a halving of the number of major amputations. There has also been a five times increase in the number of angioplasties carried out.*
Conclusions: *Our figures show the progressive, rapid increase in vascular surgical workload, compared to general surgery, and the need for the continued expansion of vascular surgery as a speciality.*

Key Words: Audit; Vascular surgery; General surgery.

Introduction

In the U.K. almost all vascular surgery is carried out by general surgeons with a vascular interest. There are those who suggest that vascular surgery should seek independent speciality status,[1] a view, however, not held by the Vascular Surgical Society of Great Britain and Ireland (VSS), but a situation which does exist in other countries. The VSS's view is that vascular surgery should remain a subspeciality within general surgery, but with a well developed scheme of training and accreditation for higher surgical trainees,[2] as already exists in the U.S.A.

The Leicester Royal Infirmary complies with the VSS recommendations for a training centre as well as being a major teaching hospital. As well as having a heavy vascular surgical workload the Professorial Surgical Unit (PSU) also deals with general surgical patients, especially when on call. This audit examines the changes that have taken place in vascular and general surgical workload on the PSU over the last 6 years. In the present changing climate of hospital management status this has significant financial as well as training implications.

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Methods

The population served by the Leicestershire Health Authority is about 890,000. The general surgical services are provided on three hospital sites, two of which also provide vascular services. During the period of this study the Leicester Royal Infirmary (LRI) employed two consultant surgeons on the PSU, with a major interest in vascular surgery. The PSU is on call for general surgery on a 1 in 3 basis and for vascular surgery on a 1 in 2. Although this audit only examines the workload of the PSU, a previous study of the treatment of lower limb ischaemia in Leicester has indicated an increase in workload in both vascular service centres.[3]

A comprehensive audit of all surgical admissions is kept in the department of surgery at the LRI and the PSU also produces its own audit data for vascular admissions. Data were collected from both these sources for the period 1 January 1987 to 31 December 1992. Information that was analysed included type of

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admission (elective/emergency); type of surgery (elective list/emergency out of hours); category of surgery (BUPA scales)[4]; individual procedures (vascular surgery only); and mortality figures. Patients undergoing endoscopy or minor surgery under local anaesthetic from the Day ward were not included. Patients who had arteriograms without interventional procedures are not included in the analysis of admissions, but figures are shown for the number performed.

Table 1. Admissions to the Professiorial Surgical Unit 1987 to 1992

	1987	1988	1989	1990	1991	1992	Deaths
General surgical (elective)	581	576	595	559	537	568	17
General surgical (emergency)	735	750	798	769	817	891	135
Vascular surgical	357	385	332	427	545	554	186

Results

The total number of general surgical and vascular admissions are shown in Table 1. Rather than take the isolated figures for 1987 and 1992 we have compared the two 3-year periods, 1987–1989 and 1990–1992, in order to try to obtain a more representative comparison of the workload. It can be seen that there has been a slight decrease (5%) in the number of elective general surgical admissions over the study period. The total number of general surgical admissions (elective and emergency) has, however, increased slightly (3%). In contrast the total number of admissions for vascular disease has increased by 42% in the same period, although the increase has been even greater over the last 2 years. The number of procedures carried out on these patients has also increased by similar proportions (Table 2). Of the general surgical admissions over the 6-year period, 42% were elective and 58% were emergency. The converse is true

Table 2. Breakdown of vascular workload 1987 to 1992 († not included in total procedures; ‡ deaths)

	1987	1988	1989	1990	1991	1992
Angioplasty	51	66	108	187	253	259
Angiogram†	167	133	149	217	206	193
Aortic aneurysms – elective	42(3)‡	39(3)	28(3)	31(2)	50(3)	45(0)
ruptured	34(10)	38(20)	26(10)	29(9)	34(19)	24(11)
Aorto-femoral	18	21	16	17	13	15
Axillo-femoral	4	2	2	2	3	4
Ileo-femoral/X-over	18	11	11	6	12	16
Femoro-popliteal	41	24	26	25	19	22
Femoro-distal	17	36	32	39	47	46
Profundaplasty	8	10	7	8	1	1
Carotid endarterectomy	23	27	12	24	43	67
Subclavian bypass	1	3	1	4	2	3
Thrombo-embolectomy – arm	4	5	6	2	6	4
leg	41	34	22	38	37	29
Sympathectomy – cervical	2	6	3	3	6	12
lumbar	7	13	5	13	8	5
Amputation – major	55	54	24	26	22	27
minor	28	18	14	13	23	21
Prostacyclin/Iloprost	1	0	7	12	12	8
Thrombolysis	5	0	2	6	3	3
Others	12	15	16	12	12	10
Total procedures	412	422	368	497	606	621

Table 3. Breakdown of general surgical emergency admissions 1987 to 1992 († percentage of patients operated on)

	1987	1988	1989	1990	1991	1992
Total admissions	735	750	798	769	817	891
Operations	259(35)†	267(36)	313(39)	293(38)	295(36)	310(35)
Head injuries	134	149	118	106	106	117
Abdominal pain (non-specific)	205	181	191	184	192	219
Others	137	153	176	213	224	245

for vascular surgery with 38% being admitted as emergencies and 62% as elective.

Looking more specifically at the reasons for admission and procedures performed, it can be seen that, overall, the majority (63.5%) of emergency general surgical patients did not have any operative procedure performed on them (Table 3). In particular 25% of the admissions were for non-specific abdominal pain. Patients with minor head injuries also accounted for a significant (15%) proportion of emergency admissions. Of the elective general surgical admissions only 3% had no operative procedure and the same figure for the vascular patients was 2%. Overall, for the general surgical procedures that were actually performed (Fig. 1), 33.0% were minor, 42.9% were intermediate and only 24.1% were major, major plus or complex major. In contrast (Fig. 2), 92.5% of the vascular procedures carried out were of major value or above (not including plain arteriograms).

There have been some striking changes in the number of certain vascular procedures carried out over the audit period (Table 2). Comparing 1987 with 1992 there has been a three times increase in the number of carotid endarterectomies, a near three times increase in the femorodistal grafts and a halving of the number of major amputations carried out. There has also been a dramatic five times increase in the number of transluminal angioplasties performed.

The figures shown for elective aortic aneurysm repairs (Table 2) include symptomatic (acute) but non-ruptured cases. The overall mortality for this group over the 6-year period is 6.0%. This compares with a mortality rate of 42.7% for the truly ruptured cases. Comparing mortality figures for all general and vascular patients over the 6 years, vascular patients have a much higher mortality rate (82.3 per 1000 patients) than do general surgical patients (19.4 per 1000 patients).

Finally, comparing the length of stay for the vascular and general surgical patients. The average

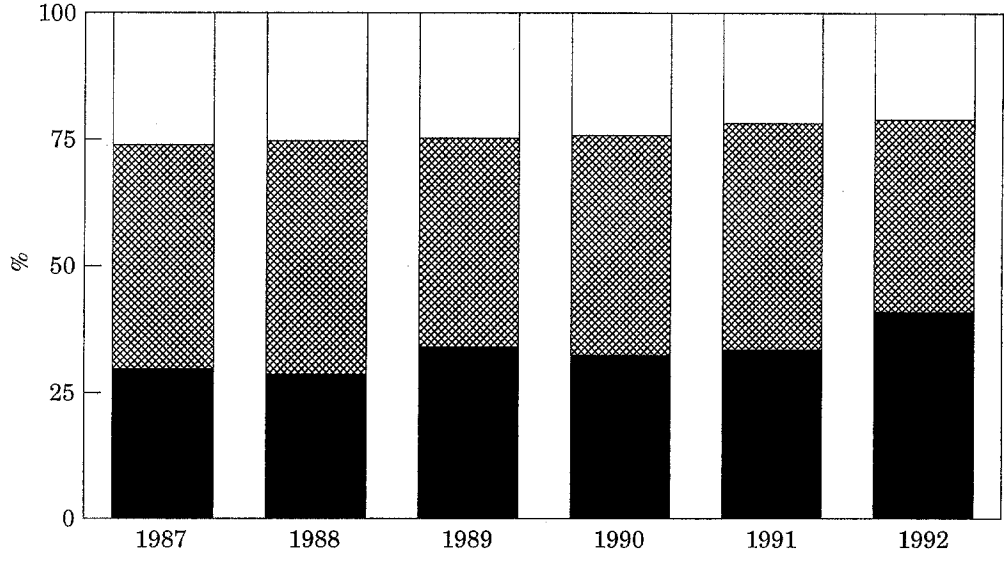

Fig. 1. Graph showing the BUPA ratings of all general surgical procedures carried out on the PSU between 1987 and 1992. ■ = Minor; □ = Inter; ▩ = Major and above.

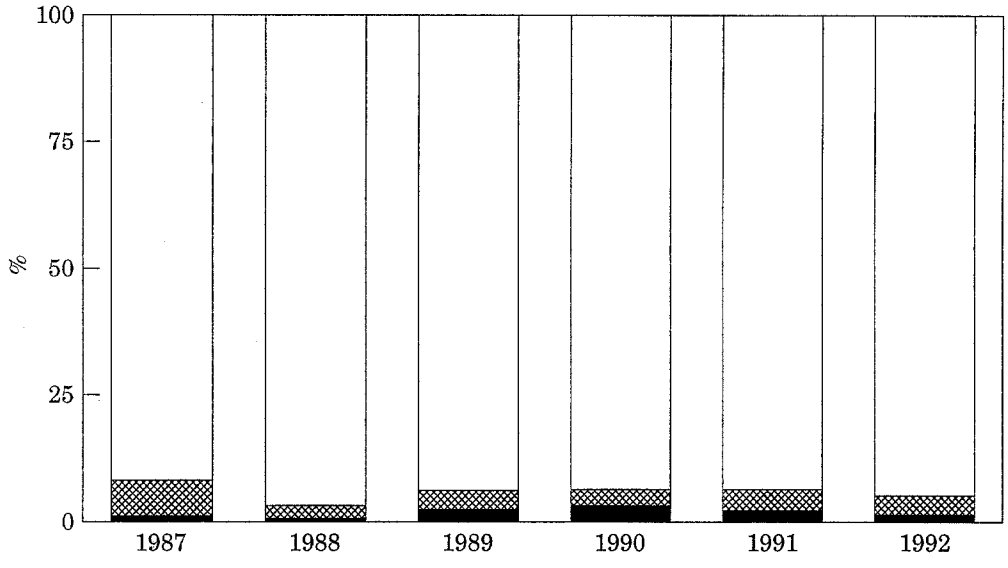

Fig. 2. Graph showing the BUPA ratings of all vascular surgical procedures carried out the PSU between 1987 and 1992. ■ = Minor; □ = Inter; ▦ = Major and above.

length of stay for the general patients was 3.3 nights (range 0–135), whereas it was 7.6 nights (0–148) for the vascular patients.

Discussion

In certain countries, such as the U.S.A. the practice of specialisation within general surgery is the rule rather than the exception.[5] Over the past few years in the U.K. there has been a tentative move towards similar specialisation in some of the larger teaching hospitals. In most hospitals, however, surgeons are still expected to provide cover for general surgery as well as patients in the remit of their specialist interest. One such specialist interest is vascular surgery and a number of protagonists have suggested that in the U.K. vascular surgery should become an independent speciality.[1] This view is not held by the majority of the VSS membership at the present time. This audit has indeed highlighted the increase in vascular workload, in our hospital, even over a relatively short 6 year period. Over the same period the general surgical workload has remained fairly static.

An important factor when comparing the workloads is the relative cost, in terms of time and money, expended on each group of patients. Overall, 64% of the general surgical patients (both emergency and elective) underwent an interventional or surgical procedure. Ninety-eight percent of the vascular patients fall in to this category, with 21% of patients having more than one procedure. In addition to this, the majority of vascular procedures were rated as major or above on the BUPA scales, whereas the reverse is true for general surgical patients.

Vascular patients also tend to be older and medically more unfit. This is reflected in the significantly different death rates and average length of stay between the vascular and general surgical groups. All in all this indicates that vascular patients account for a disproportionately high use of resources, a point highlighted in a number of previous reports.[6,7]

Table 4. Vascular patient workload per 250,000 population per year († 1992 figures)

	Emergency	Elective
Darke[1]	50	97
Barros D'Sa[1 3]	59	113
Bergqvist[1 4]	53	92
Leicester†	96	143

A report to the Vascular Advisory Committee in 1987[8] gives approximate vascular workload figures and recommends, from these, that there should be two vascular surgeons serving a population of 250,000 to 500,000 people. Comparison of the workload at the Leicester Royal Infirmary with other published reports is rather difficult because it is not the only centre in Leicester offering a vascular service. For 1992 (assuming the Royal Infirmary serves equivalent to

580,000 for vascular referrals) our emergency workload is significantly higher than in most previously reported series (Table 4). The elective workload is also higher, and taken with the emergency cases, the figures reflect the increased demand for vascular services highlighted by Roberts *et al.*[9] when reporting vascular audit in Southampton.

Various trends have emerged over the 6-year period which have a significant bearing on the future of vascular surgery. The number of angioplasties performed has increased enormously. This trend was starting to be seen in Campbell *et al*'s audit of the Oxford vascular service in 1985.[10] Although the angioplasties are mainly carried out in the Radiology Department, the patients occupy the Surgical Unit beds and nursing staff. Their funding is also down to the Surgical Directorate. Many of the patients who now have angioplasties would previously have had surgery and although the number of angioplasties carried out has increased dramatically, the number of reconstructive procedures has not fallen. This indicates a continued increase in the number of patients with vascular disease presenting for treatment.

Accompanying this increase there has been a decrease in the number of above knee femoropopliteal grafts and a slight decrease in aorto-iliac reconstructions. The number of femorodistal grafts performed has nearly trebled and this has been accompanied by a halving of the number of major amputations. The increase in distal grafts has come about because of two main reasons. Firstly the PSU has adopted a more aggressive policy in treating patients with critical limb ischaemia, in particular diabetics. Secondly, there does appear to be an overall increase in the number of patients actually presenting with distal disease, taking in to account patients having distal grafts or angioplasties for critical ischaemia.

The sudden decrease in amputations came about at a time when the policy for treating patients with critical ischaemia became more aggressive. However, since that time, because more patients are presenting with critical ischaemia the actual number of amputations has not changed dramatically, but the proportion of patients presenting with critical ischaemia and ending up with an amputation continues to fall. The recent reports on carotid artery surgery[11,12] have noticeably increased our workload for carotid endarterectomies and this will undoubtedly continue to spiral upwards.

In summary, this audit has highlighted the increased demand for vascular surgical services in an environment where general surgical requirements have remained virtually static. Vascular surgery as a subspeciality in this hospital fulfils all the requirements for vascular surgical training, but the question still arises as to whether it should become a speciality in its own right. With the increasing workload and increasing number of new technologies available, there is certainly a case for this to become so, especially on our unit.

References

1 Darke SG. The provision of vascular services. *Eur J Vasc Surg* 1987; **1**: 217–218.
2 Jamieson CW. Dilemmas in providing a vascular surgical service. *Ann R Coll Surg Engl* 1992; **74**(Suppl): 58–62.
3 Sayers RD, Thompson MM, Varty K, Jagger C & Bell PRF. Changing trends in the management of lower limb ischaemia: a 17-year review. *Br J Surg* 1993; **80**: 1269–1273.
4 BUPA schedule of procedures. the British United Provident Association. London, 1989.
5 Johnson CD. Specialisation in general surgery. *Br J Surg* 1991; **78**: 259–260.
6 Michaels JA, Galland RB. Prospective audit of vascular surgical emergencies in a District General Hospital. *Br J Surg* 1991; **78**: 1271–1272.
7 Jaffe V, Chadwick L, Tomkins M, Galland RB. General surgery with a special interest in vascular surgery: an audit of relative workload. *Ann R Coll Surg Engl* 1991; **73**(Suppl): 90–93.
8 Report to the AGM from the Vascular Surgical Society of Great Britain and Ireland. November 1987.
9 Roberts JP, Smallwood JA, Chant AC, Webster JHH. Local audit in vascular surgery. *Ann R Coll Surg Engl* 1990; **72**: 287–290.
10 Campbell WB, Souter RG, Collin J, Wood RFM, Kidson IG, Morris PJ. Auditing the vascular surgical audit. *Br J Surg* 1987; **74**: 98–100.
11 North American Symptomatic Carotid Endarterectomy Trial Collaborators. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. *N Engl J Med* 1991; **325**: 445–453.
12 European Carotid Surgery Trialists' Collaborative Group. MRC European Carotid Surgery Trial: interim results for symptomatic patients with severe (70–99%) or with mild (0–29%) carotid stenosis. *Lancet* 1991; **337**: 1235–1243.
13 Barros D'Sa AAB. Vascular surgery services in Northern Ireland. Report from a working group on vascular surgery services in Northern Ireland. DHSS NI.
14 Bergqvist D. The Vascular Registry - A responsibility for all vascular surgeons. Vascular Registry in Southern Sweden. *Eur J Vasc Surg* 1987; **1**: 219–226.

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